

UNIV-1100 — First Year Seminar: Scientific Computing Learning Community

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Mathematical Formula

Describes the height of an object in vertical motion (thrown upwards from height zero with a given initial velocity).

$$y(t) = v_0 t - \frac{1}{2} g t^2$$

y - height

v_0 - initial velocity

g - acceleration of gravity

t - time

Mathematical Formula

We can evaluate the formula for given parameter values

$$y(t) = v_0 t - \frac{1}{2} g t^2$$

given the values

$$v_0 = 5$$

$$g = 9.81$$

$$t = 0.6$$

calculate

$$y = 5 \cdot 0.6 - \frac{1}{2} \cdot 9.81 \cdot 0.6^2$$

Python commands

```
5 * 0.6 - 1.0/2.0 * 9.81 * 0.6 ** 2
```

Mathematical Formula

We can write a one-line program

$$y(t) = v_0 t - \frac{1}{2} g t^2$$

given the values

$$v_0 = 5$$

$$g = 9.81$$

$$t = 0.6$$

calculate

$$y = 5 \cdot 0.6 - \frac{1}{2} \cdot 9.81 \cdot 0.6^2$$

Python commands

```
print 5 * 0.6 - 1.0/2.0 * 9.81 * 0.6 ** 2
```

Mathematical Formula

Consider the mathematical formula

$$y(t) = v_0 t - \frac{1}{2} g t^2$$

calculate

$$y = 5 \cdot 0.6 - \frac{1}{2} \cdot 9.81 \cdot 0.6^2$$

A simple Python script

```
v_0 = 5
g = 9.81
t = 0.6
y = v_0*t - 1.0/2.0*g*t**2
print y
```

Python Program - Version I

Simple programs

```
v_0 = 5
```

```
g = 9.81
```

```
t = 0.6
```

```
y = v_0 - 1.0/2.0*g*t**2
```

```
print y
```

Python Program - Version II

Adding comments

```
# Program for computing the height of an object in  
# vertical motion.  
# Written by A. J. Meir Oct. 5, 2011  
v_0 = 5      # initial velocity  
g = 9.81     # acceleration of gravity  
t = 0.6      # time  
  
y = v_0 - 1.0/2.0*g*t**2      # vertical position (height)  
  
print y
```

Running a Python Program

Running a Python program in a terminal or from the file manager

- `python file_name.py`

For the following you will have to make the file executable You can do this from the file manager or from the command line, with:

```
chmod a+x file_name.py
```

- `./file_name.py`
- double-click `file_name.py`

Python Program - Version III

Specifying interpreter

```
#!/usr/bin/env python
# Program for computing the height of an object in
# vertical motion.
# Written by A. J. Meir Oct. 5, 2011
v_0 = 5      # initial velocity
g = 9.81     # acceleration of gravity
t = 0.6      # time

y = v_0 - 1.0/2.0*g*t**2      # vertical position (height)

print y
```

Python Program - Version IV

Specifying interpreter

```
#!/usr/bin/python
# Program for computing the height of an object in
# vertical motion.
# Written by A. J. Meir Oct. 5, 2011
v_0 = 5      # initial velocity
g = 9.81     # acceleration of gravity
t = 0.6      # time

y = v_0 - 1.0/2.0*g*t**2      # vertical position (height)

print y
```

